Math 211
Quiz 12

T 23 Jul 2019

Your name : _____

Exercise

(5 pt) Let $V = \mathbf{R}^3$ be the vector space of 3×1 matrices with entries in $\mathbf{R}$, equipped with the usual operations of matrix addition and scalar multiplication. Let

$$v_1 = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \qquad v_2 = \begin{bmatrix} 2 \\ -1 \\ 0 \end{bmatrix}, \qquad v_3 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}.$$

(a) (2 pt) Row reduce the matrix $\begin{bmatrix} v_1 & v_2 & v_3 \end{bmatrix}$ to show that the set $\{v_1, v_2, v_3\}$ is linearly independent. *Hint:* Is every column in the row-reduced matrix a pivot column?

(b) (2 pt) Compute the determinant of the 3×3 matrix $\begin{bmatrix} v_1 & v_2 & v_3 \end{bmatrix}$. *Hint:* Use expansion by minors along row 3.

(c) (1 pt) How does our computation in part (b) give us another solution to part (a)? How is the row-reduction approach in part (a) more general than the determinant approach in part (b)?